

AMENDMENTS TO THE SPECIFICATION

Please amend paragraph [0006] beginning at page 2, line 9, as follows:

[0006] For this reason, the far-side sensor being incapable of carrying out detection with respect to those regions of the detectable zone which are in the lee of the door body as this door body passes therethrough, it has sometimes been the case where a person was present in the region of the swinging door but that this could not be detected despite such fact.

Please amend paragraph [0007] beginning at page 2, line 13, as follows:

[0007] One example which may be cited as means for remedying such a problematic situation is attachment of a far-side sensor to the door body. If this is done, because the far-side sensor moves in accompaniment to the swinging of the door body, the door body will not pass through the detectable zone of the far-side sensor.

Please amend paragraph [0011] beginning at page 3, line 4, as follows:

[0011] For example, a constitution might be contemplated in which the door drive mechanism (drive motor or the like) is provided with an ability to identify the angular displacement position of the door and an output signal therefrom is received by the far-side sensor, determination as to whether an object detected by the far-side sensor is a person or other such target object intended for detection being made in correspondence to the angular displacement position of the door body.

Please amend paragraph [0016] beginning at page 4, line 15, as follows:

[0016] —SUMMARY OF INVENTION—

In order to achieve the foregoing and/or other objects, embodiment(s) of the present invention may be such that sensor(s) attached to a door body or bodies is or are itself or themselves provided with ability to detect position(s) occupied by the door body or bodies during opening and/or closing thereof, position(s) occupied by the door body or bodies during opening and/or closing thereof being identified without the need to receive door position information from external equipment, and movement of the door body or bodies may be controlled in correspondence thereto.

Please amend paragraph [0017] beginning at page 4, line 23, as follows:

[0017] —SOLUTION MEANS—

More specifically, door position detecting means, object detecting means, and object determining means may be provided. Door position detecting means may be attached to the door body or bodies that can be opened and/or closed and may be capable of detecting position(s) occupied by the door body or bodies during opening and/or closing thereof. Object detecting means may be attached to the door body or bodies and may detect presence and/or absence of object(s) in detectable zone(s). Object determining means may receive output(s) from door position detecting means and object detecting means, and may determine, in correspondence to position(s) occupied by the door body or bodies during opening and/or closing thereof, whether object(s) detected by the object detecting means are object(s) intended for detection.

Please amend paragraph [0018] beginning at page 5, line 6, as follows:

[0018] As a result of such specific features, it will be possible for door sensor(s) to itself or themselves detect position(s) occupied by the door body or bodies during opening and/or closing thereof, position(s) occupied by the door body or bodies during opening and/or closing thereof being identified without the need to receive door position information from external equipment (e.g., door drive mechanism(s)), and it will be possible for movement of the door body or bodies to be controlled in correspondence thereto. This being the case, there will no longer be a need for addition of a new ability to identify angular displacement position to door drive mechanism(s) or other such external equipment, and moreover, there will no longer be a need for wiring installation procedures to permit output signal(s) from such external equipment to be sent to door sensor(s). This being the case, it is possible to avoid making the constitution more complex and/or making installation procedures more complicated. Furthermore, with respect to automatic swing doors and other such doors which have already been installed, by simply attaching the present door sensor(s) to the door body or bodies it will be possible to control movement of the door body or bodies in correspondence to position(s) occupied by the door body or bodies during opening and/or closing thereof, and it will be possible, by retrofitting a preexisting door, to construct a door which will permit attainment of the foregoing effect.

Please amend paragraph [0019] beginning at page 5, line 23, as follows:

[0019] As the foregoing door position detecting means, it is possible, in specific terms, to employ door position detecting means which is or are attached to the door body or bodies made capable of being opened and/or closed as a result of rotational motion and which is or are constituted so as to be capable of detecting angular displacement position(s) of the door body or bodies. More specifically, door position detecting means may be made up of sensor(s) employing geomagnetism to detect angular displacement position(s) of the door body or bodies and/or sensor(s) employing gyroscope(s) to detect angular displacement position(s) of the door body or bodies. Such constitution might be suitable, for example, where the present invention is applied to automatic swing door(s), automatic revolving door(s), or the like. Furthermore, where the present solution means is applied to sliding door(s), sensor(s) capable of detecting rotation of cam(s) and/or roller(s) of slide mechanism(s) could be attached thereto.

Please amend paragraph [0020] beginning at page 6, line 7, as follows:

[0020] The following may be presented as examples of constitutions permitting control of movement of the door body or bodies in accompaniment to identification of position(s) occupied by the door body or bodies during opening and/or closing thereof. To wit, door sensor(s) may be attached to surface(s) facing toward direction(s) toward which the door body or bodies move during opening thereof. Furthermore, door controller(s) may be provided that stop, slow, and/or reverse the process of opening the door body or bodies in the event that object(s) detected by object detecting means are object(s) intended for detection.

Please amend paragraph [0021] beginning at page 6, line 14, as follows:

[0021] Furthermore, door sensor(s) may be attached to surface(s) facing toward direction(s) toward which the door body or bodies move during closing thereof. In such a case, door controller(s) may be provided that stop, slow, and/or reverse the process of closing the door body or bodies in the event that object(s) detected by object detecting means are object(s) intended for detection.

Please amend paragraph [0022] beginning at page 6, line 19, as follows:

[0022] In the case of the former constitution (i.e., a constitution in which door sensor(s) are attached to surface(s) facing toward direction(s) toward which the door body or bodies move during opening thereof) it will be possible to prevent the door body or bodies from coming in contact with person(s) or the like when the door body or bodies are being opened; and in the case of the latter constitution (i.e., a constitution in which door sensor(s) are attached to surface(s) facing toward direction(s) toward which the door body or bodies move during closing thereof) it will be possible to prevent the door body or bodies from coming in contact with person(s) or the like when the door body or bodies are being closed. Particularly in the latter case it will be possible for activation sensor(s) to also serve as door sensor(s).

Please amend paragraph [0025] beginning at page 7, line 11, as follows:

[0025] As a result of such specific features, it will be possible to cause even detectable zone(s) which might otherwise change and come to be outside of region(s) intended for detection

as a result of movement of the door body or bodies to continue to be that or those intended for detection by virtue of fixed object detecting means, making it possible to more definitively carry out detection of objects within desired range(s).

Please amend paragraph [0028] beginning at page 7, line 23, as follows:

[0028] Furthermore, whereas object detecting means may be constituted so as to permit switching between or among detectable zones, zone switching means may be provided which receives or receive output(s) from door position detecting means and which switch between or among detectable zones of object detecting means in correspondence to position(s) occupied by the door body or bodies during opening and/or closing thereof.

Please amend paragraph [0029] beginning at page 8, line 1, as follows:

[0029] As a result of such specific features, it will be possible to switch detectable zones of object detecting means, avoiding object(s) not intended for detection, in correspondence to position(s) occupied by the door body or bodies during opening and/or closing thereof. Furthermore, expansion of the ways in which door sensor(s) may be used will be permitted, inasmuch as door sensor(s) might, in correspondence to position(s) occupied by the door body or bodies during opening and/or closing thereof, temporarily be made to function as activation sensor(s), or might alternatively or additionally be made to function as safety sensor(s).

Please amend paragraph [0030] beginning at page 8, line 8, as follows:

[0030] A door which is such that any one of the door sensors of the foregoing respective solution means is attached to the door body or bodies, the door body or bodies engaging in opening and/or closing operations in linked fashion with object detecting operations of the door sensor(s), is also within the purview of the technical idea of the present invention.

Please amend paragraph [0052] beginning at page 11, line 3, as follows:

[0052] More specifically, sensor 6 attached to the near-side face of door body 3 is a near-side sensor 6 which functions as an activation sensor for, in the event that person(s) approach from the near side, detecting such fact and causing door body 3 to swing.

Please amend paragraph [0053] beginning at page 11, line 6, as follows:

[0053] On the other hand, sensor 7 attached to the far-side face of door body 3 is a far-side sensor 7 which functions as a safety sensor for, in the event that person(s) are present in the swing region when door body 3 is swinging, detecting such fact and stopping swinging, reducing swing speed, and/or reversing direction of swinging so as to prevent door body 3 from coming into contact with person(s).

Please amend paragraph [0061] beginning at page 13, line 17, as follows:

[0061] Furthermore, at the foregoing near-side sensor 6, detected object signal(s) are also be supplied to door controller 52 if object(s) detected while door body 3 is swinging in a direction such as would tend to cause it to close are determined to be object(s) intended for

detection. As a result, swinging of door body 3 in a direction such as would tend to cause it to close might be stopped, swing speed might be reduced, and/or swing direction might be reversed (i.e., door body 3 might be made to swing in a direction such as would tend to cause it to open).

Please amend paragraph [0082] beginning at page 19, line 14, as follows:

[0082] But the present invention is not limited thereto, it being possible, as shown in FIG. 8, to set detectable zones of door doors sensors 7 attached to respective door bodies 3 so as to be detectable zones directed toward portal(s) 11 (i.e., toward near side(s)). That is, when in the state shown in FIG. 8, detectable zones of door sensors 7 at door bodies 3A, 3C not positioned adjacent to portal(s) 11 are only set, just as was the case in the foregoing second embodiment, so as to be downstream in the direction of rotation from door bodies 3A, 3C (projected-light zone C1 indicated by broken line(s) in FIG. 8).

Please amend paragraph [0085] beginning at page 20, line 8, as follows:

[0085] As another variation, as shown in FIG. 9, in contrast to the fact that detectable zones - and switching of detectable zones - of door sensors 7 attached to surfaces facing toward direction(s) of rotation at respective door bodies 3A through 3D are similar to those same in the foregoing second embodiment, near-side sensors 6 which project light toward the periphery may be attached to the side edges at the outer edge side of door bodies 3A through 3D. That is, these near-side sensors 6 project light only when door bodies 3A through 3D rotate into position(s) adjacent to portal(s) 11, the constitution being such as to carry out detection with respect to

whether person(s) are not approaching from the near side. This makes it possible to avoid situations where wall surface(s) are detected and are misidentified as object(s) intended for detection when door bodies 3A through 3D rotate into position(s) not adjacent to portal(s) 11.

Please amend paragraph [0086] beginning at page 20, line 19, as follows:

[0086] FIG. 10 is a block diagram showing a control system for this variation. As shown in the drawing, respective sensors 6, 7 are equipped with zone switching means 78 similar to those same in the foregoing second embodiment. That is, the constitution of door sensors 7 which are attached to surfaces facing toward direction(s) of rotation at respective door bodies 3A through 3D is identical to that same in the foregoing second embodiment. Furthermore, the constitution of near-side sensors 6 which project light toward the periphery and are attached to the side edges at the outer edge side of door bodies 3A through 3D is as in the foregoing first embodiment but zone switching means 68 is or are additionally provided.

Please amend paragraph [0088] beginning at page 21, line 14, as follows:

[0088] —OTHER EMBODIMENTS—

In At the foregoing respective embodiments and variations thereon, the present invention has been described in terms of examples in which it is applied to an automatic swing door and an automatic revolving door. But the present invention is not limited thereto, it also being possible to apply the present invention to an automatic folding door, to an automatic upward-pivoting gate door, and so forth. FIG. 11 shows how door sensor 7 associated with the present invention might

be attached to an automatic folding door 1A, (a) being the closed state and (b) being the open state. FIG. 12 shows how door sensor 7 associated with the present invention might be attached to an automatic upward-pivoting gate door 1B such as might be installed at a parking garage or the like, (a) being the closed state and (b) being the open state. As a result of adoption of such constitutions as well, it will be possible for door sensor 7 to itself detect position(s) occupied by door body 3A, 3B during opening and/or closing thereof, position(s) occupied by door body 3A, 3B during opening and/or closing thereof being identified without the need to receive door position information from door drive mechanism(s), and it will be possible for movement of door body 3A, 3B to be controlled in correspondence thereto. In the situations shown in these drawings, object(s) not intended for detection might be wall W at automatic folding door 1A, or roof R at automatic upward-pivoting gate door 1B.

Please amend paragraph [0089] beginning at page 22, line 5, as follows:

[0089] Furthermore, in ~~at~~ the foregoing respective embodiments and variations thereon, the present invention has been described in terms of examples in which it is applied to automatic doors 1. But the invention is not limited thereto, it also being possible to apply the invention to manually operated doors. For example, a constitution may be adopted such that door sensor(s) associated with the present invention are attached to the far-side face of a manually operated swing door, audible warning(s) being emitted so as to elicit caution and/or locking mechanism(s) being actuated such as will forcibly prohibit opening of the door in the event that person(s) or the like are present at the far side thereof when an attempt is made to open the door from the near

side thereof. Note that in the case of a double-acting-type manually operated swing door, it is preferred that door sensors in accordance with the present invention be respectively attached to both the far-side and the near-side faces of the swing door.

Please amend paragraph [0091] beginning at page 22, line 21, as follows:

[0091] As described above, in one or more embodiment(s) of the present invention, sensor(s) attached to the door body or bodies is or are itself or themselves provided with ability to detect position(s) occupied by the door body or bodies during opening and/or closing thereof, position(s) occupied by the door body or bodies during opening and/or closing thereof being identified without the need to receive door position information from external equipment, and movement of the door body or bodies is controlled in correspondence thereto. This being the case, there will no longer be a need for addition of a new ability to identify angular displacement position to door drive mechanism(s) or other such external equipment, and moreover, there will no longer be a need for wiring installation procedures to permit output signal(s) from such external equipment to be sent to door sensor(s). It is consequently possible to avoid making the constitution more complex and/or making installation procedures more complicated.

Furthermore, with respect to automatic swing doors and other such doors which have already been installed, by simply attaching the present door sensor(s) to the door body or bodies it will be possible to control movement of the door body or bodies in correspondence to position(s) occupied by the door body or bodies during opening and/or closing thereof, and it will be

possible, by retrofitting a preexisting door, to construct a door which will exhibit the foregoing effect(s), provision of a highly practical door sensor being permitted.